

GENERALIZATION OF CREATIVE
PRODUCTIVE THINKING TRAINING
TO INTERMEDIATE GRADE LEARNING DISABLED
CHILDREN'S WRITTEN EXPRESSION

by

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Submitted to the Department
of Special Education and the
Faculty of the Graduate School
of the University of Kansas in
partial fulfillment of the
requirements for the degree
of Doctor of Philosophy.

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Defended July , 1984

ACKNOWLEDGMENTS

There are many persons who have made significant contributions to my professional growth. Mentioning them all would take volumes, so I will express my gratitude to many unnamed individuals and specify a few without whom I would not have been able to reach this milestone:

Dr. Floyd Hudson was there when this research idea was conceived. His encouragement was consistent.

Dr. Richard Whelan inspired me to pursue a course of study at University of Kansas. He spurred me to tackle difficult statistical concepts.

Dr. Reva Jenkins-Friedman introduced me to the challenge of educating gifted children and became a "significant other" in my life.

The faculty in my Special Education classes, faculty and staff at Pembroke Country Day School, other graduate students, parents of students who were in my classrooms, and interested friends all gave me patience, encouragement, and insight:

Delta Kappa Gamma International, Shawnee Mission Sertoma Club, and Pembroke Country Day School provided needed assistance and support.

Finally, I am grateful to my family for helping me to set and reach a goal that required much love and understanding from them.

V.L.F.

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CHAPTER I

INTRODUCTION

Assessment procedures for placement in Special Education services identify both strengths and weaknesses in students. However, remediation materials and methods have focused only on weaknesses in an attempt to help students achieve basic skills. Recently, research efforts have focused upon a growing concern for individual learning styles and the peculiar strengths and weaknesses that students bring to learning tasks (Dunn & Price, 1980; Gregorc, 1978; Renzulli & Smith, 1978). Reflecting this concern is a small, but increasing body of literature describing the assessment and training of creative productive-thinking abilities in teaching learning disabled (LD) students (Dunn, 1977; Jaben, 1979; Tarver, Ellsworth, & Rounds, 1980).

Creativity is the potential area of ability which has implications for enabling students to become more independent, self directed, and

successful (Getzels & Jackson, 1962); creative productive-thinking training is a teaching method with educational and social implications for increasing the student's involvement and responsibility for his or her own learning. Recognition of one's own responses as worthwhile could increase the LD learner's knowledge of his or her individual strengths and weaknesses, the use of those strengths, and the willingness to risk improvement of weak areas. More specifically, rationale for utilizing creative productive-thinking materials and methods includes possibilities to help LD students through (a) realization of individual potential to benefit society, (b) enhancement of self worth to reduce fear of failure, (c) metacognition to control behaviors, and (d) activation of learners to increase independence.

Rationale

In contrast to the sparseness of research in the area of creative abilities among LD populations, there exists wide support for the view that creative productive-thinking ability exists within all individuals (Maslow, 1959;

Treffinger, Renzulli, & Feldhusen, 1971; Welsh, 1977). Keating (1980) urged educators to critically evaluate programs for the development of productive thinking for intellectually underserved creative individuals.

Realization of Potential to Benefit Society

Taylor (1968) stated that it is within the rights of each individual to fully develop creative abilities. Individual self actualization and opportunity to develop have been recognized as overriding educational rights implied for all children; however, society has yet to realize an obligation to make them implicit for the creative child (Fallon, 1980; Keating, 1980). "Creativity is the . . . solution to mankind's most serious problems" (Guilford, 1967, p.147). Before the present tightening of educational budgets and economizing of teacher time, Getzels and Jackson (1962) warned that "failure to distinguish between convergent (e.g., characterized by high IQ, achievement-oriented students) and divergent (e.g., characterized by highly creative students) thinkers in our schools may have serious consequences for the future of our society" (Getzels & Jackson, 1962, p. 18).

As a whole, society has benefitted by the development of creative potential in its people in several occupations (Weinstein & Bobko, 1980). Torrance (1969) maintained that mankind cannot afford to leave scientific production and the discovery of new ideas to chance and that creativity must be developed, beginning at an early age. Identification and training of creative individuals could enable them to be selected for situations where they could fulfill themselves and benefit society (Weinstein & Bobko, 1980).

Enhancement of Self Worth to Reduce Fear of Failure

Societal expectations affect creative production (Raina, 1969; Torrance, 1969); the environment in which a person learns can make a pronounced difference in creative development (Barbe & Renzulli, 1975; Torrance, 1969). Yauman (1980) found that students placed in Special Education classes evidenced lower self concepts than those in regular classes. Furthermore, Special Education students from high socioeconomic backgrounds have been found to rank lower on self concept measures than regular students from low socioeconomic backgrounds (Smith, 1979).

It is interesting to contrast the research evidencing low self concepts in LD adolescents (Drake & Cavanaugh, 1970; Yauman, 1980) with the findings of Tarver et al. (1980), who reported that LD children have higher creativity performance scores than non-disabled children at first grade level. Tarver et al. (1980) attributed the reduction in performance scores in subsequent grades to effects of negative reactions of teachers and peers to unique verbalizations of young LD learners. Fear, anger, shame, and withdrawal were listed by Delisle (1981) as feelings which diminish a child's sense of self worth. Drake and Cavanaugh (1970) included characteristics of low ego status, supersensitivity to external clues, time panic, and paralysis of effort in describing LD adolescents.

Although self concept depends upon a number of complex factors (Hresko & Reid, 1980), there exists ample research to suggest that fear of failure strongly affects self concept (Bryan, Sonnefeld, & Grabowski, 1983; Licht, 1983; Maker, 1977). In The Aquarian Conspiracy, Marilyn Ferguson (1980) stated that "the most subtle discovery is the

transformation of fear; . . . fear of failure is transformed by the realization that we are engaged in continuous experiments and lessons. . . fear of not being efficient gradually falls away as we see . . . our priorities change" (Ferguson, 1980, p. 115).

Fear of failure can be changed by creativity training which results in improved attitudes and lessened anxiety about classroom experiences for mentally retarded (Ford & Renzulli, 1976), underachieving gifted (Delisle, 1981; Maker, 1977), and LD students (Ford, Mauser, & Renzulli, 1975). Saurenman and Michael (1980) linked creative leadership and positive self-concept in differentiating between high- and low-achieving students. Through perception of their own learning activities and the belief that problems can have solutions, valuable creativity can be unleashed in exceptional children (Davidman, 1982; Maker, 1977).

Metacognition to Control One's Own Behavior

A recent focus of applied research in LD has been that of metacognition (Hallahan & Kneedler, 1980), or studying how children understand their own learning processes.

Creative self actualization in the form of productive-thinking activities creates opportunities for children to learn to control their own academic and social behaviors. Hresko and Reid (1980) urged special educators, in particular, to provide activities to facilitate the learner's ability to construct meaning from experience so that new details could be organized by the learner into existing overall concepts.

Activation of Learners to Increase Independence

Mainstreaming of LD students in regular classroom settings, brought about by the mandate of PL94-142 to educate handicapped learners in the least restrictive environment, has increased the need for strategies to develop independence in learning. Special educators have developed several theories to explain LD childrens' lack of active involvement in learning. These include avoidance of risk-taking (Bryan, Sonnefeld, & Grabowski, 1983), inactivity (Torgeson, 1971; Wong, 1979), and fear of failure and learned helplessness (Abramson, Seligman, & Teasdale, 1978). Theorists have also sought various ways to help LD students to increase independence and to take

responsibility for their own learning: learning strategies (Deshler, Schumaker, Alley, Clark, Warner, & Lenz, 1981), specific questioning techniques to direct selective attention (Torgeson, 1979; Wong, 1979), and cognitive behavior modification (Loper, 1980).

Although they characterize students who achieve, self concept and lack of field dependency appear to be relatively independent constructs, according to Saurenman and Michael (1980). Creative involvement which produces personal relevance may lead to a reduction in problems of teacher dependency which now affect SPED classrooms (Bryan, et al., 1983). If reliance upon the teacher for learning cues is diminished, students can take responsibility for their own learning to a greater degree and teaching time can be used more economically.

Many educators have suggested that creativity fosters independence (Callahan & Renzulli, 1977; Graham & Shenker, 1980; Saurenman & Michael, 1980; Stoddard & Renzulli, 1983; Taylor, 1971; Treffinger et al., 1971) and that students must be active in their own learning (Dyer, 1978; Grimes, 1981;

Hresko & Reid, 1980; Okabayashi & Torrance, 1984; Torgeson, 1979). Barron (1969) found that persons scoring high in originality were characterized by independence and self-assertiveness. In a study of Japanese education where self-directed learning is a widespread and honored practice, Torrance (1983) reported a pervasive emphasis upon group learning and problem solving, an important aspect of creative productive-thinking activities.

Creative thinking techniques have been shown to impact upon emotionally disturbed (Gallagher, 1975) and educationally mentally handicapped learners (Ford et al., 1975; Sullivan, 1969). A limited number of studies (Dunn, 1977; Ford et al., 1975; Jabin, 1979; Tarver et al., 1980) have shown that creative productive-thinking can be trained in LD students. Furthermore, Ford and Renzulli (1974) stated that creative productive-thinking training is an area where LD and LD/gifted learners do quite well. While most special educators support Daniels (1983) in the belief that, even when LD students are also gifted, skill development cannot be left to incidental learning; many researchers have also

underscored the need for LD students to receive systematic instruction to foster creative abilities (Graham & Shenker, 1980; Klein, 1982; Stoddard & Renzulli, 1983; Weinstein & Bobko, 1980). However, for any theoretical method to prove worthwhile, it is imperative that such a method generalize to improved academic or social skills.

Purpose of This Study

The need to find an instructional technique that would enable LD students to become actively responsible for their own learning and to cope in a positive way with academic problems provided impetus for this research study. Therefore, the purpose of the present study was to investigate whether intermediate grade LD children could generalize creative productive-thinking training to significantly increase competency on a spontaneous writing task. Written expression, a disability area which has been shown to differentiate LD from normal learners (Moran, 1980; Myklebust, 1973), was utilized to compare a new method of teaching LD students, that of using creative problem-solving materials and

procedures, with a traditional instructional approach.

In order to provide a basis for this investigation, the following research question was developed: Can intermediate grade LD students generalize creative productive-thinking training to significantly increase competency in written expression? Specifically, what is the effect of productive-thinking training on specific components of a spontaneous writing task, including (a) number of words, (b) thought units, (c) subordinate clauses, (d) vocabulary, and (e) thematic maturity?

The written products of LD students in grades three-through-six were examined for the above written expression components both before and after half of the intact classrooms had received training in creative productive-thinking. Student performances, as well as initial creativity levels, were compared between the two groups and among individual subjects within each group.

Definitions

Creativity: "The quality of being creative; ability to create" (Barnhart, 1973, p. 495).

Creative: "Having the power to create; inventive; productive . . . constructive; purposeful; involving something useful or worthwhile" (Barnhart, 1973, p. 495).

Generalization: "The act or process of generalizing" (Barnhart, 1973, p. 878).

Generalize: "To extend in application" (Barnhart, 1973, p. 878).

Learning disabilities: "Children with special learning disabilities exhibit a disorder in one or more of the basic psychological processes involved in understanding or using written or spoken language. These may be manifested in disorders of listening, thinking, talking, reading, writing, spelling, or arithmetic. They include conditions which have been referred to as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, developmental aphasia, etc. They do not include learning problems which are primarily due to visual, hearing, or motor handicaps, to mental retardation,

emotional disturbance, or to environmental disadvantage" (National Advisory Committee on Handicapped Children, 1968, p.4).

CHAPTER II

REVIEW OF THE LITERATURE

The purpose of the present study was to investigate whether intermediate grade LD students could generalize creative productive-thinking training to significantly increase competency on a spontaneous writing task. To provide background on the status of existing research pertaining to the investigation, this chapter surveyed the literature related to (a) creativity, (b) generalization of creative training to academic learning, and (c) written expression.

Creativity

Barron (1969) identified creativity as the ability to bring something new into existence. His contention that creativity was energy being put to work in a constructive fashion has been given support by developers of creative productive-thinking and problem-solving materials (Christie & Maraviglia, 1978; Noller, 1977; Renzulli, 1973).

Definition

Commonly seen as one component of giftedness (Getzels & Jackson, 1962; Renzulli, 1978;

Treffinger, Renzulli, & Feldhusen, 1971), creativity has generally been viewed as an ability found within all individuals (Maslow, 1959; Treffinger et al., 1971; Welsh, 1977). Whereas some researchers have proposed that a threshold of intellect is needed for creativity to develop (Khatena, 1981; Wallach & Kogan, 1976), creative ability has generally been viewed as a separate ability from that of intelligence (Keating, 1980; MacKinnon, 1961; Treffinger et al., 1971; Weinstein & Bobko, 1980). Innate creative level does not appear to make a significant difference in an individual's ability to use imagination (Khatena, 1982).

Studies of creative traits have indicated a continuum in the population at large, regardless of other abilities (Ford, Mauser, & Renzulli, 1975; Getzels & Jackson, 1967; MacKinnon, 1961). Guilford (1959) inferred that a person could be highly capable in certain areas, but not necessarily all. His Structure of the Intellect (SOI) model differentiated 120 conceivable components, each reflecting an interactive relationship between a

specific process, certain content, and a type of product (Guilford, 1962).

Several dimensions of creative ability have been identified. Farnham-Diggory (1972) defined the first step in the creative process as an intensive preparation or acquisition effort. Guilford (1962) had previously designated what became the second step as divergent thinking, including aspects of originality, fluency, flexibility, and elaboration. Raskin (1980) found parallels between creative and narcissistic traits--those of self-absorption, a rich inner life, primary thinking, impulsivity, lack of empathy, and need for recognition. In contrast, Sigg and Gargiulo (1980) concluded that impulsivity was not significantly associated with creativity after investigating reflectivity and impulsivity in nonverbal creative processes of normal and LD children. Klein (1982) identified similarities in long lists of creative traits as perceived by well-known creative persons, creative professionals, and junior high students. These traits included ability to maximize options, defer judgment, seek

freedom, accept inconsistencies, and take risks; positive action orientation and a responsible and/or responsive attitude were also seen as characteristic of creative personalities. This concept of creative abilities has application to personal growth, human development, and education (Klein, 1982).

Assessment

Complex in nature, creativity has not been easily defined, nor has it been susceptible to accurate measurement (Treffinger et al., 1971). Attempts to define creative ability for assessment purposes have emphasized creative characteristics, products, processes, or a combination of those elements (Klein, 1982).

Of characteristics. Research of personality and biographical characteristics described by authors of creativity tests have proven helpful in examining creativity within individuals. The characteristics of independence, flexibility, perseverance, and wide breadth of interests were most often cited in identification instruments (Getzels & Jackson, 1962; Rimm, Davis & Bien, 1982; Smith & Schaefer, 1969; Torrance, 1966; Welsh,

1977). Self-reporting and parent inventories have proven particularly successful instruments for identifying creative personalities within minority groups (Sternberg, 1982).

Of product. Although theories about creative traits may differ, most definitions of creativity include the concept of creating something new or novel in its use. Torrance (1962) theorized that, even if an idea or product had been previously discovered, creativity involved the production of an idea that was new, original, or satisfying to the creator. Identification of creative strengths, particularly those talents in artistic or musical areas, has frequently combined products with parent and student interviews, observation rating scales, and teacher rating scales (Renzulli, 1976).

Of process. While a product is not required by all theorists attempting to define creativity, two important process-oriented aspects of creativity are generally accepted:

1. a richness or quantity of ideas
2. a period of intense preparation for later creative integration (Farnham-Diggory, 1972).

Khatena (1982) stated that available process-oriented measures have established creativity as important to school learning. He urged educators to take advantage of instruments whose psychometric and practical soundness has been evidenced, namely those measuring divergent thinking processes and/or fluency, flexibility, originality, and elaboration (Guilford, 1967; Renzulli, 1973; Torrance, 1969). These test batteries have operationalized creative thinking as specific process skills related to brainstorming, forced relationships, multiple viewpoints, categorization, planning, imagery, and modification techniques. Torrance (1982) has proposed some more recent process dimensions, including resistance to premature closure, fantasy, extending or breaking boundaries, and unusual visual perspective.

Examination of the creative process has frequently included scrutiny of environmental factors which have been shown to affect the process (Callahan & Renzulli, 1977; Dettmer, 1981; Klein, 1982; Sullivan, 1969). Creative abilities of LD and LD/gifted students are often squelched by school experiences (Ellis-Schwabe & Conroy, 1983),

are more often favored by veteran teachers (Raina & Vats, 1979) and are enhanced by mentors or teachers who "made a difference" (Torrance, 1981, p. 55). Research has shown that attitudes of teachers can be changed toward both students and creative problem-solving activities (Callahan & Renzulli, 1977; Dettmer, 1981). Classroom atmosphere which promotes creativity includes characteristics of (a) acceptance of varied rates of development, (b) deferred judgment (Klein, 1982), (c) de-emphasis of the word can't, (d) allowance for student freedom and risk-taking (Pankove, 1967), (e) group discussion, (f) availability of a wide variety of resources (Sullivan, 1969), and (g) non-judgmental acceptance of ideas (Klein, 1982; Renzulli, 1973).

Training

Although school experiences have frequently by-passed divergent thinking practices for more popular convergent methods, creative thinking has been shown to be an ability which can be trained through meaningful experiences (Barron, 1957; MacKinnon, 1962; Treffinger, et al., 1971). Many categories of learners have been assessed in regard to creativity training.

For gifted learners. Since creativity is generally seen as one component of giftedness (Renzulli, 1978; Treffinger et al., 1971), most training for creative thinking has been done with gifted populations. Mauser (1975) explained the societal paradox of gifted learners: prejudice and suppositions that their natural capabilities will help them find their own way "may keep them out of training where they could be very successful" (p. 30). This paradox points out the special programming needs of gifted children, an idea for which there exists a great deal of support (Barron, 1969; Getzels & Jackson, 1967; Keating, 1980; Maker, 1977; Whitmore, 1980). In studying problem-solving strategies, Ludlow and Woodrum (1982) found that gifted students needed greater time per initial trial than did average students, implying the need for opportunities for reflective practice in multiple discrimination tasks, one type of special programming for gifted students.

In 1973, a change was taken toward programming especially for the creative child when specific materials, New Directions in Creativity (NDC): Levels Primary, Mark I and Mark II (Renzulli, 1973),

provided planned activities emphasizing creative, non-goal directed tasks, according to Guilford's SOI model. There followed research with several published materials that were designed expressly for the needs of children in specialized gifted programs, but which could also be used as an enrichment program for an entire class (Callahan & Renzulli, 1977; Christie & Maravaglia, 1978; Ludlow & Woodrum, 1982; Noller, 1977). Utilizing materials which emphasized productive-thinking during a two-year period, Thomas and Holcomb (1981) provided further evidence that able students could make significant increases in the use of higher process thinking (i.e., application, elaboration, synthesis, and evaluation).

Of increasing concern has been the underachieving gifted student, characterized by deficient academic skills and low esteem (Abroms, 1981; Fine & Pitts, 1980; Whitmore, 1980; Wolf & Gyci, 1981). Some of these low-achieving students have evidenced creative strengths, particularly in the arts (Maker, 1977; Torrance, 1972). Traditionally, programs for gifted children have placed emphasis on academic skills; however

closing the door to talent in non-academically oriented fields has involved failure to realize the significant contribution that could have been made by stimulating differing creative abilities in the classroom setting (Fallon, 1980).

For normal learners. Employing the premise that creative traits exist along a continuum in the population at large, numerous researchers have shown that these traits may be enhanced by intervention and training (Callahan & Renzulli, 1977; Christie & Maravaglia, 1978; Covington & Crutchfield, 1967; Graham & Sheinker, 1980; Noller, 1977). While tests of creative abilities are seldom used in regular classrooms, divergent thinking activities--viewed as thought-stimulators, idea generators, and horizon-expanders--have frequently been included in curriculum materials and teacher-preparation courses (Hresko & Reid, 1980).

For handicapped learners. A limited number of studies of creative productive-thinking training have been conducted with handicapped populations. Sullivan (1969) reported success with developing problem-solving skills with mentally handicapped learners; Gallagher (1975) gave evidence of response to creativity training in emotionally disturbed

children, as did Ford and Renzulli in 1976.

Discussion of the benefits of training emotionally disturbed and other handicapped learners in creative activities has emphasized improvement in the areas of self-concept and socialization (Ford, Mauser, & Renzulli, 1975; Ford & Renzulli; Gallagher, 1969).

For learning disabled learners. Studies involving training of creative abilities in LD, while not numerous, have indicated positive results. Dunn (1977), Ford et al. (1975), Jaben (1979), and Tarver, Ellsworth, and Rounds (1980) have provided evidence that creative problem-solving skills can be increased through training in LD elementary grade students.

Learning disabled gifted (LD/G) students have frequently been among those excluded from gifted programming opportunities because of lack of scholastic achievement (Croft, 1982). According to Croft (1982), traditional identification procedures exclude many students who could produce high levels of work if given opportunity. The proposed use of a Revolving Door Identification model considers a variety of assessment instruments

and uses a contractual product-oriented instructional plan for involving students for varying lengths of time (Croft, 1982). With LD and LD/G students who need specific, reachable goals (Daniels, 1981; Mercer & Mercer, 1981), a contractual model appears to be a functional approach for instruction.

Generalization

In order for instructional methods to be useful in the classroom, such methods must generalize to academic areas. A short discussion of generalization follows in order to put the purposes of the present investigation into perspective.

Hunt (1962) defined generalization as the combining of conceptual elements. This combining, or categorization, refers to "conditioning of a response to a trace stimuli and not to the stimuli itself" (p. 53) and "is made easier if the learner who is generalizing looks for one concept rather than many" (p. 54).

In Normal Academic Development

Hull's Systematic Behavior Theory (Hilgard & Bower, 1975) included generalization as one link--

located between reinforcement and motivation-- in a chain of six major processes which happen when a learned response is evoked. Hull's inferential system was anchored to observable antecedent events and to measurable, observable reactions. Practice was believed necessary for learning to become appropriate to a wide range of stimuli, with the extent of generalization depending upon similarities between test and training stimuli (Hilgard & Bower, 1975). Generalization, assumed to be a normal part of the learning process, was regarded as "learning to learn" (Hunt, 1964, p. 93), or "habits" (Hilgard & Bower, 1975, p. 75). Likewise, it was assumed by developers of creative productive-thinking materials that generalization happened naturally through practice with creative productive-thinking materials (Christie & Maravaglia, 1978; Covington & Crutchfield, 1965; Renzulli, 1976; Taylor, 1971).

In LD Students

Whether due to environmental factors (Abroms, 1981; Keogh, 1978; Pankove, 1967) or innate

disabilities (Kaufman & Kaufman, 1973), evidence exists to indicate that LD students do not make a significant number of generalizations in the same way as do normal learners (Bryan, Sonnefeld, & Grabowski, 1983; Deshler, Schumaker, Alley, Clark, Warner, & Lenz, 1981; Wong, 1980). Hilgard and Bower (1975) found that conceptual abilities of brain injured learners were more tied to physical than to abstract elements, suggesting the need for longer periods of practice with concrete materials before a gradual introduction of gradient stimuli to which to generalize learnings.

Research in the LD field has increasingly recognized the difficulty and importance of measuring generalizability of skills to classroom or wider social settings (Deshler et al., 1981; Keogh, 1978). Transfer appears to occur to the extent that the learner can carry certain aspects of previous learning to situations that are only partly novel (Poplin & Gray, 1980).

The need to insure generalization of skills acquired in special education settings is receiving increased attention from educators (Keoth, 1978;

Schmidt, 1983), but current teaching practices suggest that professionals do not realize that generalization does not automatically occur once a skill or strategy has been learned in one setting under one set of conditions (Deshler et al., 1981).

Schmidt (1983) provided two broad examples of the lack of generalization training in remedial approaches: (a) despite widespread use of training LD students in basic learning processes, little proof exists that this training produces academic gains, and (b) behavioral approaches that stress direct, sequential teaching have generally corrected learning problems one at a time instead of planning for generalization.

One approach which promises to address generalization is that of self-management which includes cognitive strategies of analyzing task requirements, describing steps to be taken, and using self-instruction (Miechenbaum, 1975). Schmidt (1983) evidenced success with four conditions for generalizing students' writing strategies from resource room to regular classroom: review, transfer activities, cooperative planning, and self control.

Investigating the application of creative productive-thinking training to academic areas has been neglected. A search of the literature revealed two studies indirectly related to creativity and generalizability with LD students: Cunningham and Murphy (1981) found a notable improvement in arithmetic after LD adolescent boys were trained in EEG feedback, and Rack (1981) gave testimony to training in special adaptive traits to improve creative talent in an area of deficit in a dyslexic student. For the most part, the focus in the field of special education has been on achievement rather than aptitude components of learning. By attempting to enhance the creative abilities of LD children, an effective change may be made for the LD child (Fallon, 1980). Research is needed to address the question of generalizability of creativity training to performance in academic areas.

Written Expression

Written expression was chosen as the object of transferability in this study. In normal developmental sequence, written expression follows oral language, a major concern in the history of LD (Hresko & Reid,

1980). Expressive writing has been shown to be one discernable factor in differentiating between LD and nonLD students (Moran, 1980).

Components

According to Test of Written Language (TOWL) developers Hammill and Larsen (1978), important components of written expression include (a) handwriting, (b) spelling, (c) productivity, (d) vocabulary, and (e) thematic maturity. Other educators have added grammar and syntax, as well as a broader category of mechanical aspects (Hresko & Reid, 1981; Mercer & Mercer, 1980).

Mechanical aspects. Handwriting, spelling, and grammar have long been successfully taught and assessed through convergent thinking approaches (Daniels, 1983; Hresko & Reid, 1980). Although mechanical aspects represent a sizable instructional focus for LD, they do not appear to be related to divergent thinking and, therefore, are excluded from discussion in the present review of literature related to the generalization of creative productive-thinking to written expression.

Productivity. The number of words written, a divergent thinking task, is considered by many experts

to be an indicator of maturity of written expression (Hammill & Larsen, 1978; Heil, 1976; Martin, 1975; Myklebust, 1973).

Myklebust (1973) found that students classified as reading disabled wrote fewer words than those not so classified; Deno, Marston, and Mirkin (1982) related total words written and number of mature words to valid achievement measures for LD populations. Picture stimuli and narrative composition have been favored in measures to assess productivity (Hammill & Larsen, 1978; Heil, 1976).

Productivity has been extended beyond the concept of number of words to quantify further dimensions of quality in written tasks, including number of thought (t-) units--segments of meaningful expression containing an identifiable verb and its subject--and number of subordinate clauses. Hunt (1965) reported that his t-unit index, which counts numbers of main clauses without regard to sentence punctuation, was the most reliable method of predicting the student's grade level when blind ratings were used. Golub and Kidder (1975) found two factors which accounted for a high percentage

of variance in teacher ratings of students' writing, those of number of words and number of subordinate clauses.

Vocabulary. Vocabulary development was defined as language acquisition by Hresko and Reid (1983) and as unusual words and variety of words by Mercer and Mercer (1981). Stimulation for vocabulary includes physical, geographic, and community experiences from which gifted children develop unusually advanced vocabularies with "richness of expression, elaboration, and fluency" (Guilford, Scheuerle, & Shonburn, 1981, p. 59).

Teachers of LD students have been urged to take the role of stimulator, a more active role than facilitator, to promote development of vocabulary (Hresko & Reid, 1981). Daniels (1983) suggested that four facets of vocabulary development must be recognized in instructional programs, those of (a) simple language acquisition, (b) expansion to precise words based on appreciation of context, (c) understanding of nuances and emphasis, and (d) stratified vocabulary indigenous to a specialty field. Vocabulary was seen as a written expression

component equal to fluency, structure, and content by Mercer and Mercer (1981). They urged teachers to avoid excessive correction of mechanical aspects and to promote the positive idea that what is written is more important than how it is written. This attitude has been upheld by many researchers (Daniels, 1983; Hresko & Reid, 1981; Hunt, 1967).

Thematic maturity. Interest in expressive writing develops early in most children (Dale, 1976). However, learners must have opportunities to see that their writing is influential and that others see it as worthwhile for maturation to develop (Hresko & Reid, 1981; Maker, 1979; Stoddard & Renzulli, 1979). If given proper opportunities, mildly handicapped learners are capable of creative, even poetic writing (Hresko & Reid, 1981).

Language experience approaches (Daniels, 1983; Maker, 1979), regular opportunities to engage in literary writing (Atwell, 1981; Stoddard & Renzulli, 1983), and employment of the few available packaged materials to teach written composition (Hresko & Reid, 1981; Stoddard & Renzulli, 1983; Torrance, 1972) have been seen as important for LD, LD/G, normal, and gifted students. Measuring the quality of writing of

talent pool students in self-contained classes and in pull-out programs, Stoddard & Renzulli (1983) concluded that writing sessions within the regular classroom were instrumental in producing a superior quality of writing.

Assessment

In the literature on written expression, two evaluative theories have emerged. They are described as either holistic or atomistic, also called analytic evaluation (Moran, 1980).

Holistic evaluation. Holistic assessment occurs when the reader judges the gestalt and rates writing in terms of effect of the whole product. Both cognitive and affective reactions of readers are combined in an overall impression. Multiple passes through the written product are frequently made (Hresko & Reid, 1980; Moran, 1980). Despite the interest in favoring the use of holistic scoring of writing, particularly among teachers in content areas like social studies and science (Atwell, 1982), there has been disagreement as to a common set of guidelines for evaluating written products in this manner (Moran, 1980). Stoddard and Renzulli (1983) found that use of holistic

assessment encouraged students to produce longer, but not necessarily higher quality written stories than did analytic evaluation.

Analytic evaluation. Whereas holistic evaluation appears to be favored by teachers who are not directly responsible for teaching writing skills, analytic evaluation appears to be more common with English teachers and others concerned with teaching of writing skills. A broad array of analytic methods is available, including scope and sequence charts, rating scales, skills checklists, error analysis charts, criteria questions, and comprehensive organized inventories (Moran, 1980). Despite the variety of available evaluative formats, few efforts to establish the relative usefulness of such measures in describing writing skills have been recorded in the literature on written expression (Moran, 1980).

Special Education

Most special educators have employed more atomistic than holistic methods in teaching written expression. Although holistic experience approaches have often been utilized to provide meaningful purposes for writing, composition has generally

been divided into atomistic mechanical aspects, vocabulary, grammar, and syntax, each of which receives individual focus (Hresko & Reid, 1981; Mercer & Mercer, 1980). In order for handicapped learners to chart their own progress, self-evaluation has been successfully utilized after clearly defined standards have been taught (Hresko & Reid, 1981).

There exists at least one test of writing, the Test of Written Language (TOWL), which has been standardized for LD populations (Hammill & Larsen, 1978). In addition to mechanical aspects, vocabulary, and thematic maturity, the TOWL measures productivity in the form of words written and number of subordinate clauses.

Summary of Literature

The consensus of many educators is that creativity is an innate ability that can be trained (Barron, 1969; Christie & Maraviglia, 1978; Renzulli, 1973; Treffinger et al., 1971). Creative productive-thinking, a component of the creative process (Torrance, 1969), has been established as important to school learning (Khatena, 1982); however, LD students are often

discouraged from developing this ability in classroom settings. If creative productive-thinking training is to be useful to teachers and students, such training must generalize to academic tasks. In the past, no research studies have addressed the generalizability of creative productive-thinking to written expression tasks. Therefore, research is needed to address the question of generalization of creative productive-thinking training to performance in written expression and in other academic areas.

CHAPTER III

METHODS AND PROCEDURES

The present study was undertaken to investigate whether intermediate grade LD children could generalize creative productive-thinking training to significantly increase competency on a spontaneous writing task. A new method of teaching, that of using creative problem-solving materials and procedures, was compared with a traditional instructional approach. Using intact classrooms, the investigation analyzed differences between groups on initial creativity level and on number of (a) words written, (b) thought (t-) units, (c) subordinate clauses (d) vocabulary, and (e) thematic maturity on written expression tasks given before and after training in creative thinking activities.

Subjects and Settings

Subjects were selected from six elementary schools and one LD clinic located in metropolitan Kansas City. All subjects were (a) between the chronological ages of 9-5 and 12-6 years old,

(b) enrolled in third-through-sixth grade classes for LD, (c) identified by their respective schools as LD, and (d) within low normal-to-above average intellectual range.

Effort was made to carefully describe subjects for this study, using variable markers suggested by Keogh (1978). Teacher subjects were certified to teach LD students by their respective states. The 36 male and 13 female subjects met local and state criterion for identification and placement and were served in self-contained LD classrooms at the time of the study. In both Kansas and Missouri, LD students had been identified on the basis of a significant discrepancy between the individual's general intellectual functioning and academic achievement. Lack of achievement for these students was not attributed primarily to physical, emotional, environmental, or cultural disadvantage or to history of inconsistent educational programming. At the district levels, placement was made by a multidisciplinary team utilizing multiple measures to assess levels of performance for referred students in order to compare intellectual potential to functional achievement.

Full scale scores on individually administered tests of intelligence fell within a range of 80-123 for subjects in this study (See Table 1). Students who were enrolled in the classes but were of low intellectual functioning level (below 80) were permitted to participate in class activities, but scores were not reported in this investigation. Academic achievement levels were indicated from records showing the most recent testing of students in math, reading, and written expression. A variety of commonly used achievement tests for assessing LD students' performance had been used.

Subject Selection

A proposal was sent to five metropolitan school districts requesting intact LD classrooms for participation in the present study. Two Kansas City, Missouri, classrooms for severely LD students located in an inner-city school; four self-contained classes for LD in two city and two suburban Kansas City, Kansas, schools; and one university LD clinic classroom agreed to participate and were designated by their Special Education (SPED) coordinator and/or building principal as cooperative

classrooms. Kansas City, Missouri, classrooms served combined third-fourth and fifth-sixth grades; Kansas City, Kansas, classrooms served fourth-fifth grades, and the LD clinic served all grades represented in the study.

Classrooms were randomly selected by the investigator as Experimental (E) and Control (C) classrooms and were approved by their SPED coordinators and/or building principals and consent letters (see Appendix D) were sent home and returned. The mean grade levels were 4.4 for E group, 5.0 for C group. The final pool of students numbered 49, with one of the original 54 returning his consent form after the study had begun, two functioning on less than low average intellectual level, and two being absent due to household moves or illness when written expression tests were administered.

Demographic Data

Through inspection of cumulative records, a description of subjects was obtained. Sex, academic achievement level, and intellectual functioning level are developed in Table 1. Age range included 9 years, 5 months to 12 years, 6 months. Mean age for each group at the time of initial testing was E = 10.01, C = 10.7.

Table 1

Sex, IQ Ranges, Achievement Levels by Groups

	Experimental	Control
Sex		
Girls	8	5
Boys	17	19
Average Grade Level Achievement		
Reading	1.7	1.9
Math	1.8	2.1
Written Language	1.7	1.5
Number of Students in each IQ Range		
80-84	4	0
85-89	7	14
90-110	8	7
111+	6	3

The number that had been retained ($E = 8$, $C = 7$) and the mean number that had moved during their educational history ($E = 1.8$, $C = 1.5$) were recorded. E group averaged 1.0 prior years in SPED while C group averaged 1.6 years. English was spoken in the homes of all subjects; however, the ethnic backgrounds varied: E group represented 13 Black and 12 Caucasian children; C group included 13 Black, 10 Caucasian, and 3 Mexican-American students.

Teacher interview was used to indicate individual problems in each group's activity level, attention, auditory perception, visual perception, fine motor coordination, memory, or oral language. The data are reported in Table 2. According to their teachers, no students were characterized by auditory or visual learning problems. Effort was made to record all descriptive data stressed as important (Keogh, 1978) for enhancing generalizability and further replication of research studies in the LD field.

TABLE 2

 Characteristics of Students

Characteristic	Group	
	Experimental	Control
Hearing loss	2	4
Wearing glasses	4	2
On medication	0	2
Allergies	3	0
Seizures	0	1
Neurological implications	0	1
High activity level	0	4
Attention problems	3	5
Fine motor problems	0	3
Memory problems	1	5
Speech problems-		
Articulation	3	2
Expressive speech	3	2
Severe speech delays	1	4

Instrumentation and Scoring

The Torrance Test of Creative Thinking (TTCT) (Torrance, 1974) was chosen as an initial measure of creative productive-thinking ability for this investigation. TTCT stresses components of fluency, flexibility, and originality according to Guilford's (1967) Structure of the Intellect (SOI) theory. Rather than to test specific creativity factors, Torrance attempted to construct complex tasks which would be models of the creative process. Hand scoring of the TTCT, a time consuming but relatively easy task (Mahan & Mahan, 1981), depends upon number, novelty, and variety rather than upon predetermined correct responses.

Social validity in relation to behaviors in the TTCT setting to that of school or life "generally remains obscure . . . but still this test can be useful in helping youngsters to develop their divergent thinking" (Mahan & Mahan, 1981, p. 16). TTCT has proven a popular assessment instrument for research with many subjects: mentally retarded (Ford & Renzulli, 1976;

LD (Dunn, 1977; Ford, Mauser, & Renzulli, 1976; Graham & Sheinker, 1980; Jaben, 1979), emotionally disturbed (Gallagher, 1975), gifted (Khatena, 1982), and normal learners (Mahan & Mahan, 1981).

Mahan and Mahan (1981) called TTCT "the best known . . . creativity instrument . . . designed for school use" (p. 165), and Khatena (1982) stated that it "can tell with a high level of predictability how creative processing of information by individuals occurs" (p. 22).

Torrance had used subtest Tin Can: Unusual Uses, the creative productive-thinking ability measure chosen for the present study, in an earlier test of creative abilities (Torrance, 1962, 1974). This subtest involves a verbal task where the subject is instructed to think of and list the cleverest, most interesting, and as many unusual uses of tin cans, which may be changed in any way, as possible. In a test-retest study which included the Tin Can subtest, Mackeler and Shontz (1967) found increased creativity levels, with relative placement within the group remaining the same, after a second testing. On the third testing,

creativity level did not increase or decrease significantly, indicating that creative output can be increased, but not in a direct linear manner (Mackeler & Shontz, 1967).

Intratest reliability for Tin Can subtest and Torrance's other Figural and Verbal subtests has been found significant at the .01 level (Mackeler & Shontz, 1967; Mahan & Mahan, 1981). Originality scores were utilized for this study since both fluency and flexibility scores have been found to be reflected in originality scores according to weighted measurement (Dunn, 1977; Kaltsounis, 1969; Torrance, 1962, 1974). TTCT was used to compare the creativity levels of E and C groups at the beginning of the present study.

New Directions in Creativity (NDC) (Renzulli, 1973), the creative productive-thinking materials utilized for intervention activities, were also based upon Guilford's (1967) SOI and Torrance's (1974) Verbal and Figural classifications. In a pilot study to determine the effectiveness of NDC with 660 sixth graders in urban, suburban, and rural school settings, Callahan and Renzulli (1977) reported that the main effect of NDC training

proved to be significant ($p < .01$ level) for all TTCT subscores. Class rank did not have a significant effect on any TTCT scores; however, there was wide variability between classrooms within the treatment group suggesting that NDC's positive effect on creative productive-thinking can be modified by teacher attitudes and classroom setting (Renzulli, 1973). The present study was planned to provide thrice-weekly opportunities for creative productive-thinking activities, NDC, designed to draw from the students' backgrounds of experience. Like TTCT, NDC has stood the test of time as an established creative productive-thinking material with researchers (Callahan & Renzulli, 1977; Davidman, 1982; Ford, Mauser, & Renzulli, 1975; Renzulli, 1978; Rimm, Davis, & Bien, 1982).

Since an appreciative audience has been seen as essential to purposeful written expression (Hresko & Reid, 1980) and for freedom of creative expression (DeHaan & Havighurst, 1961), the classroom peer group was designated as an audience for student products and verbal efforts in this study. Attention was given to guidelines for accompanying brainstorming

activities within a non-judgmental classroom atmosphere stressed by researchers (Callahan & Renzulli, 1977; DeHaan, 1961; Renzulli, 1973) in order to render the materials as effective as possible.

Pretest and Posttest

The Test of Written Language (TOWL) (Hammill & Larsen, 1978) was chosen as a measure of productivity, both before and after intervention with creative productive-thinking materials. Students' spontaneous products on the TOWL--written narratives in response to picture stimuli--were chosen to be analyzed according to test manual specifications for (a) number of words, (b) t-units, (c) subordinate clauses, and for the subtests (d) Vocabulary and (e) Thematic Maturity.

Number of words written is considered by many experts to be an indicator of maturity of written expression (Heil, 1976; Martin, 1975; Myklebust, 1973). Several other studies provided support for the utilization of TOWL components for assessment with LD students: number of t-units and maturity of themes (Deno, Marston, & Mirkin,

1982), picture stimuli, and narrative composition (Heil, 1976).

Additional research exists to support the TOWL's measurement of t-units, along with other measures of productivity--number of words and number of subordinate clauses. Hunt (1965) reported that his t-unit index, which counts the number of main clauses written without regard to sentence punctuation, was the most reliable method of predicting the student's grade level when blind ratings were used. Additionally, Golub and Kidder (1974) found two factors that accounted for a high percentage of variance in teacher ratings of students' writing, those of number of words and subordinate clauses.

Reliability for the overall TOWL subtests was found to be .80 (Hammill & Larsen, 1978), with the homogeneous items dealing with style, spelling, and word usage exhibiting the highest degree of internal consistency. Earlier, Guilford had stated that a "meaningful estimate of reliability for heterogeneous tests is test-retest variety" (Guilford, 1967, p. 446). Reliability of heterogeneous subtests in the present study were

reported to be: t-units = .74, Thematic Maturity = .86, and Vocabulary = .62 (Hammill & Larsen, 1978).

Content validity for the TOWL was divided into criterion-related validity and construct validity, using a standardization sample of 1.709 subjects that included LD and mentally retarded students. All three subtests correlated significantly ($p < .01$ level) with an established language test (Myklebust, 1965) and teacher ratings for written products for combined groups. Criterion-related validity for LD students included Vocabulary and t-units correlated at the .01 level of significance. Overall construct validity related to age, the intercorrelation within the test, was reported at .50, with Thematic Maturity and t-units the highest correlation under focus at .48 (Hammill & Larsen, 1978).

Procedures

The present study followed sequential procedures that included (a) a pilot study, (b) inservice training, (c) pretests, (d) intervention activities, (e) posttest, and (f) reliability checks.

Pilot Study

An abbreviated preliminary pilot study involving three LD students not included in the study was conducted by the investigator. The purpose of the pilot study was to establish that students in intermediate grades would willingly participate in the TTCT Tin Can: Unusual Uses, the NDC materials, and the TOWL. Two fourth graders and a fifth grader participated; their scores ranged from below average to average on the TTCT and TOWL.

Inservice Training

Prior to the first week of intervention, inservice training was conducted for teachers and interested administrators in each of the participating districts. Teachers of both E and C groups were given materials and were trained in administering the subtest, TTCT Tin Can: Unusual Uses, Form B (Torrance, 1974) and the TOWL: Story subtest (Hammill & Larsen, 1978) according to test manual instructions. Each training workshop took approximately 30 minutes.

During an additional 30 minutes, teachers of E classroom groups were given NDC materials

designated in order for each of the nine weeks, and were trained in administering NDC through modeling and role-playing experiences. Written guidelines for group sharing activities (see Appendix C) were provided and were reviewed in a role-play setting.

Observation of teacher-practice sessions and a written evaluation form responding to clarity of training and comprehension of directions for administration of tests was used to evaluate inservice training (see Appendix A). On a one-to-ten scale, with ten representing total clarity of understanding, the mean evaluative response of trained teachers was:

1. Training - 9
2. Directions - 8

Pretests

One day during the first week of the study, teachers administered the TTCT in their classroom groups, recording each student's rereading of his list on tape so that no responses were lost due to poor handwriting or spelling. The TOWL Story section was also administered during the first

week of the study as a non-timed, pencil and paper written expression task. These products were analyzed according to test manual specifications.

Intervention

The second week of the study, students in the E group began nine weeks of intervention activities. Classes spent approximately 15 minutes per day, three days each week, on paper and pencil tasks in NDC and an additional 15 minutes per day on listening to or participating in a sharing and brainstorming activity. Student worksheets were collected with no evaluative comments in an attempt to remove classroom evaluational pressures which, according to Wallach and Kogan (1979), disrupt cognitive powers. The intervention activity followed a structured format outlined below:

1. Fifteen minutes per day were given to individual completion of worksheets, three days per week, for nine weeks.

2. Fifteen minutes per day were also spent sharing individual written ideas and brainstorming, using the following guidelines:

- a. All ideas were to be considered acceptable and were to be received.

non-judgmentally, that is, without positive or negative responses from teacher or students.

b. Each student was free to share his or her idea if it was different from those previously shared.

c. The teacher recorded ideas during brainstorming sessions and posted them for observation during the remainder of the week.

E classroom activities were observed during one intervention lesson to insure that guidelines for classroom rules (see Appendix C) were being observed. Positive written feedback, citing specific use of observed brainstorming guidelines being put into practice, was given each teacher (Appendix C).

Interscorer Reliability

Interscorer reliability (Hall, 1973) for all scoring systems was determined by having two scorers independently score 10% of all written and tape-recorded products. The scorers' tallies were compared item by item to determine agreement. The percentage of agreement was calculated by dividing the number of identical items by the number of

TABLE 3

Interscorer Reliability

Test	% Agreement	
	Pretest	Posttest
<u>TTCT</u>	93	
<u>TOWL</u>		
Words	100	100
Thought Units	99	100
Subordinate Clauses	85	89
Vocabulary	94	96
Thematic Maturity	83	87

agreements plus disagreements and multiplying by 100. Table 3 reports the data for the assessment of interscorer reliability, ranging from 83% to 100%.

Posttest

The ninth week of the study, TOWL story section posttest was again administered. Since no other form of the TOWL was available, opinions were asked from four special educators, and agreement was unanimous that LD children would willingly repeat the spontaneous writing task.

Experimental Design

A nonequivalent control-group design, regarded by Campbell & Stanley (1963) as "well worth using" (p. 47) was used in the present study. An advantage of this design's use of intact classrooms is the absence of reactive arrangements caused by disruption of classroom routine because of a nonfamiliar person administering tests and treatment. After intact classrooms were randomly assigned to treatment, both groups were given pretests and posttest as part of the regular classroom schedule. Experimental group also participated in NDC treatment as a regularly scheduled classroom activity.

The nonequivalent control-group design has the strengths of a true experimental design except that it does not control for interactions between subject selection and other factors such as history and maturation. Although Campbell and Stanley (1963) considered such interactions unlikely, effort was made to describe subjects in respect to historical and maturational factors (see Figures 1, 2, and 3) in order to avoid interactions of these factors and selection differences between E and C groups.

Statement of Hypotheses

The following null hypotheses were examined:

Hypothesis 1. No significant differences will be found between E and C groups' adjusted mean difference scores for total words written on the TOWL.

Hypothesis 2. No significant differences will be found between E and C groups' adjusted mean difference scores for number of t-units on the TOWL.

Hypothesis 3. No significant differences will be found between E and C groups' adjusted mean

difference scores for number of subordinate clauses on the TOWL.

Hypothesis 4. No significant differences will be found between E and C groups' adjusted mean difference scores for Vocabulary on the TOWL.

Hypothesis 5. No significant differences will be found between E and C groups' adjusted mean difference scores for Thematic Maturity on the TOWL.

Analyses

This study was analyzed by multivariate analysis of covariance. The between subjects factor was the treatment, NDC activities. The dependent variables were the difference scores on the pretest-posttest writing samples. The covariate was the TTCT.

Hypotheses 2-5 dealt with whether creative productive-thinking activities, NDC, had generalized to produce an effect on mean difference scores on a test of written expression, the TOWL. Regression analysis was used to determine the correlation between creativity levels, as

measured by the TTCT, and mean difference scores on the TOWL. Multivariate analysis of covariance was then used to examine adjusted mean difference scores on the TOWL for the five dependent variables using TTCT scores as covariate.

CHAPTER IV

RESULTS AND DISCUSSION

The present study was undertaken to investigate whether intermediate grade learning disabled (LD) children could generalize creative productive-thinking training to significantly increase competency on a spontaneous writing task. Using intact classrooms, the investigation analyzed differences between groups on initial creativity level and on number of words, (b) t-units, (c) subordinate clauses, (d) vocabulary, and (e) thematic maturity on written expression tasks given before and after training in creative productive-thinking activities. The 49 subjects in this study were (a) between the chronological ages of 9-5 and 12-6 years old, (b) enrolled in third-through-sixth grade classes for LD, (c) identified by their respective schools as LD, and (d) within low normal-to-above average intellectual range.

Initially, Torrance Test of Creative Thinking TTCT, Tin Can: Unusual Uses (Torrance, 1974) and the Test of Written Language (TOWL) story section

(Hammill & Larsen, 1978) were administered by teachers of intact classroom groups. The use of regular teaching staff to conduct experimentation within the schools is important when findings are to be generalized to other classroom situations (Campbell & Stanley, 1963, p. 21). TTCT scores were used to determine the initial creative productive thinking levels of the two groups. Results were analyzed to determine whether pretest-posttest mean gains, or difference scores, on components of the TOWL might be affected by differing initial creativity levels between groups. Spontaneous writing in response to pictures on the TOWL story pretest established mean group scores for written expression components including (a) words, (b) t-units, (c) subordinate clauses, (d) vocabulary, and (e) thematic maturity.

Classrooms randomly chosen as the experimental (E) group participated in New Directions in Creativity (NDC) (Renzulli, 1973) three times each week for nine weeks with the remainder of the classroom instructional time being spent in a traditional manner. Control (C) group students continued traditional basic skills instruction

during the entire nine weeks. Students in E group attempted individual worksheets followed by a group participation activity involving sharing of ideas and brainstorming in a non-judgmental atmosphere. After nine weeks, the TOWL story subtest was again administered to E and C groups. All tests were handscored with interscorer reliability agreement ranging from 83% to 100%.

Statistical Tests of Hypotheses

The nonequivalent control-group design of the present study was composed of two LD groups: 25 students in E, and 24 students in C group classrooms. A multivariate analysis of covariance (MANCOVA) was used to study the dependent variables of mean difference, or change scores for number of (a) words, (b) t-units, (c) subordinate clauses, (d) vocabulary, and (e) thematic maturity on the TOWL.

Although there exists some controversy about the use of multiple dependent variables, a recent article in the American Statistician (Laird, 1983) recommended covariance with difference scores in order to handle most sources of variance.

Covariance with difference scores takes into account the level at which each group started on the pretest. This approach appeared preferable for the present study, rather than using multiple dependent variables and multiple covariates.

According to Cook and Campbell (1979), "which analysis is most precise with nonequivalent groups depends upon the particular circumstances of the research project" (p. 183). While ANCOVA or blocking is recommended as a precise measure of the size of the mean pretest difference between groups when random assignment of subjects is used (Cook & Campbell, 1979), analysis of gain, or difference scores is recommended "when investigators are interested in whether individual treatment groups changed" (Laird, 1983, p. 329) and "when pretest distributions are not the same" (p. 330), as was the case in the present study. "Analysis of difference scores is appropriate if the purpose is to compare populations with respect to average gain" (Bock, 1975, p. 492).

All statistical procedures were done by the Honeywell Series 60, Level 66 Distributed Processing System 3/E at the University of Kansas. Consultation

with statisticians at University of Kansas and use of the Bio Medical Data Processing Manual (Dixon, 1981) indicated that the use of difference scores with TTCT covariate was appropriate for the present nonequivalent control group design. "Unfortunately . . . ANCOVA has not been clearly defined when covariates are measured at each level of multivariate factors for more than two levels" (Dixon, 1981, p. 400); TOWL pretest scores for five subtests represented five levels.

E and C groups' mean pretest scores on the TTCT were compared to determine initial creativity level. Total responses measured Originality, including weighted Fluency and Flexibility scores. Mean total responses entered for each subject were compared between groups by a t test and are reported in Table 4. The probability of occurrence of the t value of -3.95 (df = 47) is .000 for a two-tailed test. Consequently, these results, with C group scoring significantly higher in initial creative productive-thinking than E group, suggested that TTCT scores should be considered as covariate when inspecting data from TOWL pretest-posttest scores.

TABLE 4

Mean Originality Scores on the TTCT

Group	Mean	<u>S.D.</u>	<u>t</u> Value	Probability
Experimental	1.80	1.26	-3.95	.00*
Control	3.54	1.79		

* $p < .05$

TABLE 5
Correlation of TTCT and
TOWL Difference Scores

Subtest	Beta	<u>t</u> -value	<u>SE</u>	Significance Level
Words	.05	.33	3.53	.75
T-units	.08	.52	.41	.61
Subordinate Clauses	.18	1.21	.11	.23
Vocabulary	-.02	-.16	1.61	.87
Thematic Maturity	.01	.06	.17	.95

Regression analysis for within cells error term was then used to determine the correlation between TTCT and TOWL difference scores on the five subtests. These results for Beta values, the t-values, standard errors, and significance levels are reported in Table 5; they suggest that initial creativity level did not have a significant effect on change scores for either group.

The difference scores were derived from subtracting pretest from posttest scores on the TOWL. E and C group means are found in Table 6.

A multivariate analysis of covariance was conducted utilizing Pillais, Hotellings, and Wilks tests (approximate $F = 4.18$, $df = 5, 42$). These tests are more appropriate than a series of univariate tests of significance since they control for the probability of making a Type I error (Cook & Campbell, 1979; Winer, 1962). Results were significant at the .004 level for group effect when using TTCT scores as covariate and comparing adjusted means of TOWL difference scores for E and C groups; these results suggested that overall treatment made a significant difference.

The dependent variables were the five mean pretest-posttest difference scores. Table 7 was developed to show the mean difference scores and their standard deviations.

Visual comparison of the mean difference scores shows that, while E group gained in pretest-posttest scores for every dependent variable, C group increased in Words and Vocabulary and decreased slightly in Thought Units, Subordinate Clauses, and Thematic Maturity. Although E group pretest means were consistently lower than C group and would, therefore, be expected to increase, the dramatic rate of increase above the C group levels can be attributed to treatment effects. Mean differences, adjusted mean differences, t -values, standard errors, and levels of significance are reported in Table 8. Adjusted mean differences represent mean differences adjusted for the TTCT covariate. Results of the t tests suggest that significant differences between groups were found for the dependent variables of t-units, subordinate clauses, and thematic maturity ($p < .05$), with subordinate clauses and thematic maturity having the highest significance level ($p < .01$).

TABLE 6

Group Means on the TOWL

Subtest*	Group	Pretest	<u>SD</u>	Posttest	<u>SD</u>
Wd	E	28.24	18.53	55.72	48.02
	C	38.46	20.62	47.04	23.70
T-un	E	4.04	2.56	6.80	5.13
	C	5.68	3.33	5.58	2.86
SbCl	E	.08	.28	.92	1.55
	C	.50	.72	.33	.57
Voc	E	14.24	12.97	24.92	19.38
	C	16.25	9.70	24.50	14.30
ThMa	E	1.84	1.38	3.40	2.45
	C	2.20	1.67	1.88	1.15

*Wd (Words)

T-un (Thought-units)

SbCl (Subordinate Clauses)

Voc (Vocabulary)

ThMa (Thematic Maturity)

TABLE 7

Mean Differences, Standard Deviations
for Subtests by Group

Subtest	Group	Mean Difference	<u>SD</u>
Words	E	27.48	47.25
	C	8.58	21.54
Thought- units	E	2.76	5.05
	C	-.08	3.45
Subordinate Clauses	E	.84	1.60
	C	-.17	.57
Vocabulary	E	10.68	19.40
	C	8.25	13.67
Thematic Maturity	E	1.56	2.08
	C	-.33	1.40

TABLE 8

Mean Differences,

Adjusted Mean Differences, t Values,
 Standard Errors, and Levels of Significance
 for TOWL Subtests

Subtest	Mean Differences	Adjusted Mean Differences	<u>t</u> Value	<u>SE</u>	Level
Wd	18.90	10.45	1.70	6.16	.10
T-un	2.84	1.61	2.28	.72	.03*
SbCl	1.01	.62	3.14	.20	.01*
Voc	2.43	.99	.35	2.81	.73
ThMa	1.89	.96	3.21	.30	.01*

* $p < .05$

Hypothesis 1

No significant difference will be found between E and C groups' adjusted mean difference scores for total words written on the TOWL. The probability of occurrence is $1/10$ for a two-tailed test (Table 8); therefore, the null hypothesis was not rejected. Consequently, results showed that there was not a significant difference between E and C groups' mean difference scores for total words written.

Hypothesis 2

No significant difference will be found between E and C groups' adjusted mean difference scores for number of t-units on the TOWL. The probability of occurrence is .03 for a two-tailed test (Table 8); therefore, the null hypothesis was not rejected. Consequently, results showed that there was a significant difference between E and C groups' mean difference scores for number of t-units written on the TOWL. NDC activities are judged to have generalized to improved number of t-units, as measured by the TOWL story subtest, after a nine-week training period.

Hypothesis 3

No significant differences will be found between E and C groups' adjusted mean difference scores for number of subordinate clauses on the TOWL. The probability of occurrence is .01 for a two-tailed test (Table 8); therefore the null hypothesis was rejected. Consequently, results showed that there was a significant difference between E and C groups' mean difference scores for subordinate clauses on the TOWL. NDC activities are judged to have generalized to improved number of subordinate clauses, as measured by the TOWL story subtest, after a nine-week training period.

Hypothesis 4

No significant differences will be found between E and C groups' adjusted mean difference scores for vocabulary on the TOWL. The probability of occurrence is .73 for a two-tailed test (Table 8); therefore the null hypothesis was not rejected. Consequently, results showed that there was not a significant difference between E and C groups' mean difference scores for vocabulary on the TOWL.

Hypothesis 5

No significant differences will be found between E and C groups' adjusted mean difference scores for thematic maturity on the TOWL. The probability of occurrence is .01 for a two-tailed test (Table 8); therefore, the null hypothesis was rejected. Consequently, results showed that there was a significant difference between E and C groups' mean posttest scores for thematic maturity on the TOWL. NDC activities are judged to have generalized to improved thematic maturity, as measured by the TOWL story subtest, after a nine-week training period.

Summary

In summary, Hypotheses 2, 3, and 5 were rejected because of significant differences between groups on adjusted mean difference scores on the TOWL. MANCOVA compared adjusted difference scores on the TOWL, taking into account the scores on the TTCT as covariate. Since E group's adjusted difference scores are shown to be significantly higher than those of C group, NDC is judged to have generalizability

after a nine-week period of training to (a) number of t-units, (b) number of subordinate clauses, and (c) thematic maturity on a TOWL written language task for intermediate grade LD students.

CHAPTER V

SUMMARY AND CONCLUSIONS

The present study was undertaken to investigate whether intermediate grade LD children could generalize creative productive-thinking training to significantly increase competency on a spontaneous writing task. Using intact classrooms, the investigation analyzed differences between groups on initial creative productive-thinking level and on number of (a) words, (b) thought units, (c) subordinate clauses, (d) vocabulary, and (e) thematic maturity on written expression tasks given before and after training in creative thinking activities.

Subjects and Settings

Seven self-contained classroom groups for learning disabled students, located in metropolitan Kansas City, provided subjects who were (a) between the chronological ages of 9-5 and 12-6 years old, (b) enrolled in third-through-sixth grade classes for LD, (c) identified by their respective schools as

LD, and (d) within low normal-to-above average intellectual range. The 36 male and 13 female subjects had been identified in either Kansas or Missouri on the basis of a significant discrepancy between the individual's general intellectual functioning and academic achievement.

Procedures

A nonequivalent control-group design was used in the present study, with teachers of intact classrooms conducting all testing and teaching procedures. The first week of the study, the Torrance Test of Creative Thinking (TTCT) (Torrance, 1974) was administered as an initial measure of creative productive-thinking ability, along with the Test of Written Language (TOWL) Story subtest (Hammill & Larsen, 1978).

The TOWL was administered by classroom teachers as a pretest and posttest measure of productivity. Students' spontaneous products on the TOWL--written narratives in response to picture stimuli--were chosen to be analyzed according to test manual specifications for

number of words, t-units, subordinate clauses, and subtests Vocabulary and Thematic Maturity.

In addition to handscoring of all tests by the investigator, reliability checks were conducted. Interscorer reliability (Hall, 1973) for all scoring systems was determined by having two scorers independently score 10% of all written and tape-recorded products, resulting in a range of 83% - 100% agreement.

Summary of Results

The present study investigated a new method of teaching, that of using creative problem-solving materials and procedures with LD students, as compared with a traditional instructional approach. A research question was developed: Can intermediate grade LD students generalize creative productive-thinking training to significantly increase competency on a spontaneous writing task? Specifically, what is the effect of productive-thinking training on specific components of the TOWL, including (a) number of words, (b) t-units, (c) subordinate clauses, (d) vocabulary, and (e) thematic maturity?

Multivariate analysis of covariance procedures were used to analyze the present study. Results were interpreted from mean difference scores on five components of the TOWL as dependent variables with scores on the TTCT used as covariate.

Although C group was found to be at a higher level of initial creative productive-thinking than E group, regression analysis determined that the TTCT and TOWL mean difference scores were not highly correlated, suggesting that initial creativity level had little effect on the level of change for either group. Adjusted mean difference scores on the TOWL were then compared by a multivariate analysis with TTCT as covariate to provide evidence that creative productive-thinking activities, New Directions in Creativity (Renzulli, 1973), had generalized to produce a significant effect on adjusted TOWL mean difference scores ($p < .05$) for number of t-units, subordinate clauses, and thematic maturity. Adjusted mean difference scores for vocabulary and number of words written

did not show evidence of a significant generalized effect ($p .05$) of NDC after a nine-week training period.

Discussion of Strengths and Weaknesses of Methodology

Overall, the methodology of the present study was considered strong. Subjects numbered 49, a group close to the 50 suggested for external validity in using intact classrooms (Campbell & Stanley, 1963). Subjects were thoroughly described by extensive variable markers (Keogh, 1978). Teacher training received high evaluative marks, and classroom observations found that NDC activities were being conducted reliably in all settings. Scoring reliability was high. This study used traditional statistics with randomization of intact classrooms, not individual subjects. Campbell and Stanley (1963) suggested that results run the risk of underestimation of significance when there are only two experimental conditions and all available subjects are used (p. 24), as was the case in the present study.

Another strength of the present study was its tie to curriculum, that is, written expression. Creativity training on an abstract level may lead

researchers to conclude that training does not make a difference when lack of student gains was due to a content-free approach to creativity training. The present study used a creativity pretest and productive-thinking materials that were based on constructs relating to the creative processes of fluency, flexibility, and originality (Guilford, 1967; Renzulli, 1973; Torrance, 1974) and were applicable to written expression tasks (Hammill & Larsen, 1978).

A limitation of this study is that it cannot be assumed to generalize to populations other than LD students in urban and suburban settings. Different grade groups across states may also have had some unknown effect on initial creative productive-thinking level or upon trainability of subjects.

Implications for Future Research

Several directions for future research can be implied from the findings in this study. Training in creative productive-thinking activities was shown to give evidence of effective generalization to improved scores for written expression components of (a) number of t-units, (b) number of subordinate clauses, and (c) thematic maturity.

These findings should impact upon training of teachers for LD students and inservice training for regular classroom teachers who have mainstreamed LD students in their language arts classes. The datae and results in this initial probe strongly suggest that research is needed to address the possible changes in LD students who participate in creative productive-thinking activities in regard to measures of (a) self concept, (b) activation of self-directed learning, (c) metacognition, or understanding of one's own learning, as well as (d) academic achievement. Since nine weeks of creative productive-thinking training was found to give evidence of improving selected components of written expression with LD students, similar studies should explore the possibilities of generalizability to other curricular areas. Another important follow-up study would be examination of durability of gains in classes that include/don't include creativity enhancing materials.

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Appendix A

$$\begin{array}{r} 1 \text{-----} 10 \\ - \qquad \qquad \qquad + \end{array}$$

EVALUATION OF INSERVICE TRAINING

(Please rate your understanding of the training session on a scale of 1 to 10, with 10 being total understanding. Thank you.

Training

(The explanations and role-play helped me understand how to conduct the testing in my own classroom.)

Directions

(The written directions are clear and easy to understand when I refer to them.)

Appendix B

Week of September 26-

96

Send home permission slips. (Have child write his name on the first blank.) Be sure the other children see the first one being returned and you allowing the child to choose a puffy sticker from those in the can. Give a puffy sticker for each permission slip that is returned. Remind children nightly to bring permission slips back.

Week of October 4-

Torrance Test of Creative Thinking:

Each child needs-

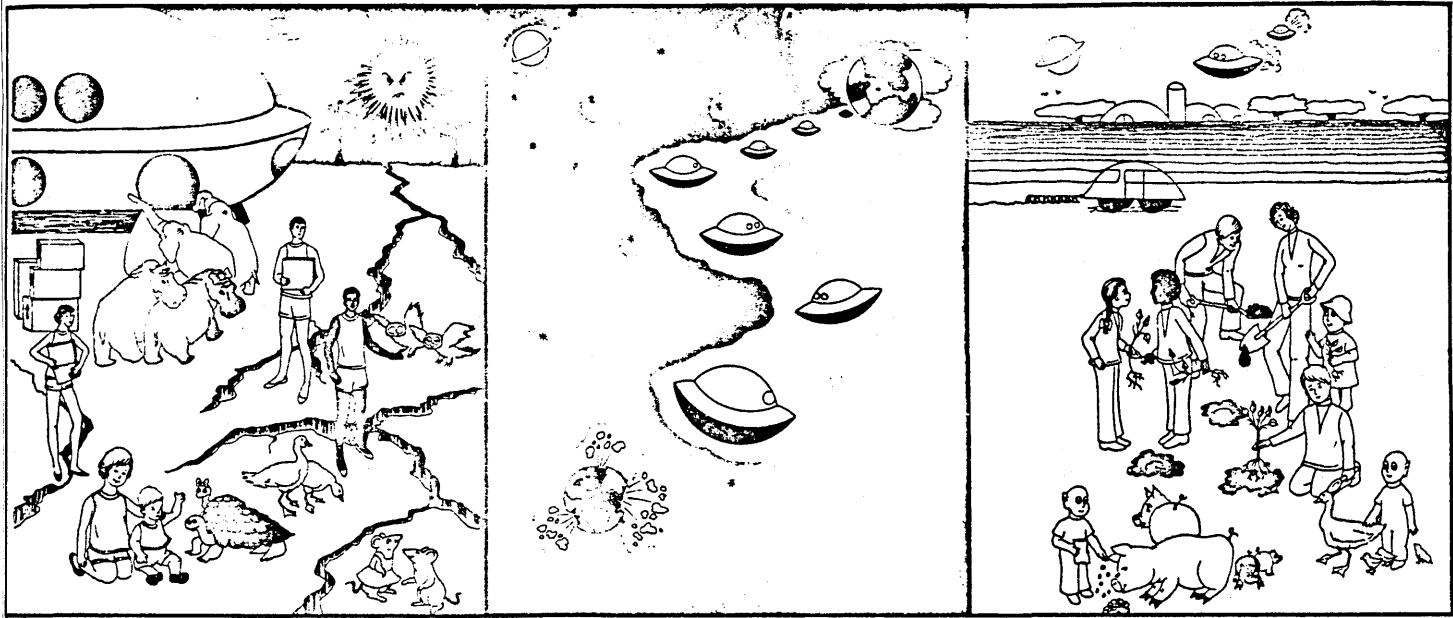
1. pencil and eraser
2. something inside desk to do quietly if s/he finishes before others

Distribute sheets.

1. Tell students to write their full names on them.
2. Tell them that they are to remain quietly in their seats when they are finished. Spelling doesn't count, so they are to do the best they can in writing down their ideas. Tell them they will get a chance to read their answers to you, so you will know what they mean without giving spelling help or writing help.
3. Read the directions. Hold up the tin can while reading them.
4. Say "Begin. Work quietly. Put down all the ideas you can. Remember to sit quietly in your seat until we are all done."
5. When all students appear done (or after 15 minutes), collect all papers. Be sure complete names are on them.
6. Individually, have each student read his/her list privately to you. Write in anything you think I will not be able to decipher.
7. Put tests in a manilla envelope with "Virginia Fortner" on it. Please alphabetize by last names and collect all tests in this same order for the project (students' names will not be considered; in order to assign a number to each student and match all his scores, I'll need them all turned in in the same order. Thanks!)

Week of December 5 (by December 9, please!)-

Repeat TOWL story test. Use same directions as on TOWL test during the week of October 4. Remember to keep them in order, alphabetized by last names. Put in manilla envelope for me to pick up at school office.



Instructions: Look at the three pictures above and make up a good story to go with them. Take about five minutes to think about your story. Be sure to write a complete story using all three pictures. It is best to plan a whole story before you begin to write.

(0)

(2)

(3)

Activity 5: UNUSUAL USES (Tin Cans)

98

Most people throw their tin cans away, but they have thousands of interesting and unusual uses. In the spaces below and on the next page, list as many of these interesting and unusual uses as you can think of. Do not limit yourself to any one size of can. You may use as many cans as you like. Do not limit yourself to the uses you have seen or heard about; think about as many possible new uses as you can.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____

Appendix C

Begin week of October 4. Remember to collect papers in same order (alphabetical by last names) that you collected tests and put them in that order in folders. I will pick up all worksheets at the end of the nine-week period. Thanks.

Plan 15 minutes/day, three days/week for completion of worksheets.
Omit week of Thanksgiving vacation.

If possible, use the same time each week for worksheet and activity.
Make a note of any unusual circumstances (student absent, special event scheduled that day, or the like) that might alter results.

Plan:

1. Be sure each student has pencil, eraser, something to do quietly at desk in case s/he finishes before others.
2. Pass out worksheet (order given on attached sheet; ONE PER DAY) Remind them that their ideas are important. Spelling doesn't count, so they are to do the best they can to put down their ideas. PUT FULL NAME on paper.
3. Read directions to class. Watch to see that each student begins worksheet and writes at least two answers. If needed, individual help may be given to get him/her started.
4. Complete all of worksheet possible. Remain quiet until all finish.
5. When all are through (or at the end of 15 minutes), students share their ideas in this way:
 - a. All ideas are shared that are different from those previously mentioned.
 - b. All ideas are important. Teacher and students listen to each idea without comment (either negative or positive) and accept it non-judgmentally.
 - 1) If a comment or gesture is given by anyone, gently remind class that all ideas are acceptable. If the same person forgets again, s/he will be removed from the group until the end of the sharing activity.
 - 2) Teacher must also refrain from any comment on ideas! All are acceptable.
 - c. Teacher records each idea on a chart (if written) to be displayed for the remainder of that week. If worksheets are drawing activities or are quite lengthy and varied, all sheets may be displayed on a bulletin board for the week.
6. Collect worksheets by last-name alphabetical order, saying "Thank You." If asked, assure the student that they will not be graded. "I just want to remember your ideas," should explain why you're taking papers.
7. Put papers in order gathered in folder to be returned to me at end of 9 weeks. Place teacher-chart in back of each day's worksheets at end of each week.

Week of October 4, BEGIN !

Week Worksheet Order-

- 1 8 What's Happening? (b)
 14 Eye Spy (b)
 22 Let's Pretend (a)
- 2 18 Make a Character (b)
 16 Cartoon Captions (b)
 14 Alternate Uses (a)
- 3 5 Picture writing (b)
 7 Way Out Words (a)
 18 Make a Sentence (a)
- 4 18 Tall Tales (a)
 18 Tall Tales (b)
 31 Let's Write a News Story (b)
- 5 20 Sights, sounds, and smells (a)
 7 Words With Many Meanings (b)
 22 Can You Design It? (a)
- 6 12 Figure completion (b)
 3 Consequences (b)
 16 Words With Feeling (b)
- 7 33 Creative Story Generator (b) *(die in can for selection)
 14 Planning (a)
 5 Time to Rhyme (a)
- 11 Alternate Uses
- 8 11 Alternate Uses (b)
 7 Advertising Game (b)
 17 Let's Write a News Story (a)
- 9 1 Thinking About Things (a)
 11 Talk Show (a)
 5 Another Point of View (a)

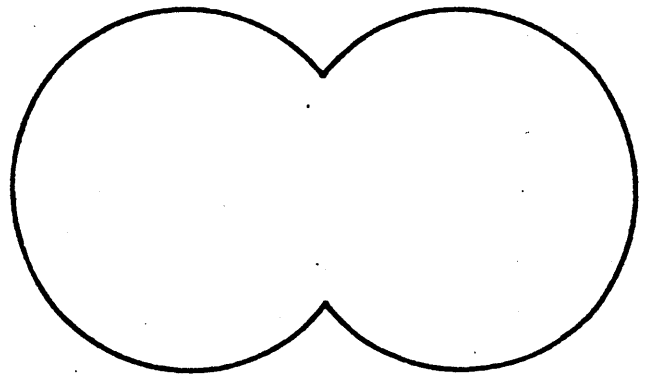
Name _____ Date _____

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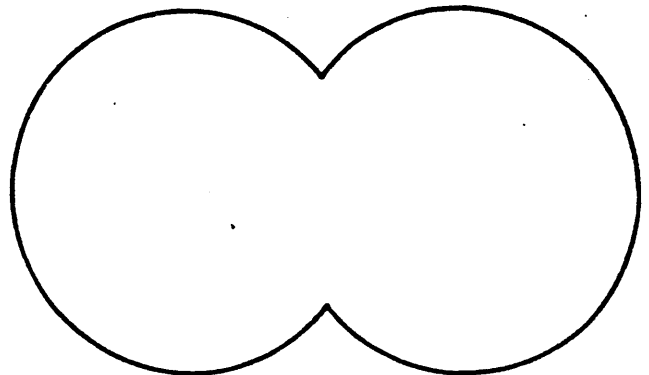
14 Eye spy (b)

Pretend that you have magic binoculars. They let you see places as no one before has ever seen them. What do you find?

looking at Mars _____



looking deep into a sea ____



BELIEVE YOU UNDERSTAND WHAT YOU THINK I SAID. BUT, I AM NOT SURE YOU REALIZE THAT WHAT YOU HEARD IS NOT WHAT I MEANT. I TRY TO BE CLEAR.

Dear _____
 Thank you for letting me drop in.
 You did a good job. I know it
 was hard to keep from comment-
 ing on the ideas the class
 shared. Some were very unique!
 Your students seemed to feel that
 their ideas were important. You're
 doing a good job! Thanks for
 helping on my research.

Virginia
 —————

Appendix D

October, 1983

Dear Parents of _____,

I am a Kansas University student and am doing research in your child's classroom. Two ten minute tests will be used to see if creative thinking activities can help students to improve their writing skills. Some classrooms will do creative thinking worksheets for 45 minutes per week for nine weeks. I would like the help of your child in my research. If you will allow him to help, please sign this form and return it to Ms. _____ by October 30, 1983. If you wish to withdraw from the study, you may do so at any time.

Thank you,

Virginia Fortner
Virginia Fortner

My son/daughter, _____, has permission to help with Mrs. Fortner's research.

Parent

Virginia:

Here are events which I feel you should know about ¹⁰⁴ that may affect how my class or an individual child did on a certain day (absences, illnesses, special events, etc.)

<u>Date</u>	<u>Event</u>	<u>Child(ren) Affected</u>
10/6/83	absent	

Teacher, School